



Proposed Replacement of CALINE3 with AERMOD in Appendix W NPRM

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Summary of EPA proposed actions for mobile source modeling

- Propose to replace CALINE3, CAL3QHC, and CAL3QHCR with AERMOD as the Appendix A preferred dispersion model for all mobile source modeling of inert pollutants
- Proposal is based on the following:
 - AERMOD has updated dispersion science relative to CALINE3
 - Model intercomparisons show that AERMOD outperforms CALINE3
 - Simplified implementation of mobile source modeling for CAA requirements
- Updates to Sections 4.2.3 and 7.2.3 of the proposed Appendix W



CALINE3 Background/History

- CALINE3 developed by Benson (1979).
 - Dispersion theory based on “P-G stability classes”
 - Single meteorological condition
- CAL3QHC developed from CALINE3 for screening
 - Adds queueing algorithm for emissions from intersections
- CAL3QHCR developed from CAL3QHC for refined analyses
 - Adds the ability to use 1-year of meteorological data, hourly emissions variation, additional averaging periods
 - Met preprocessor only available for very old met data
- CALINE3 replaced by CALINE4 (Benson, 1984)



AERMOD Background/History

- Promulgated as the EPA's preferred dispersion model for most applications in 2005 revisions to Appendix W
- Reflects state of the science dispersion model formulation, i.e.,
 - Planetary boundary layer (PBL) scaling parameter to characterize stability and determine dispersion rates
 - Monin-Obukhov (M-O) similarity profiling of winds near the surface
 - In replacing ISC3 in 2005, one of the major technical advancements was to replace the P-G stability class dispersion estimates (same as CALINE3) with the turbulence-based dispersion rates consistent with PBL and M-O

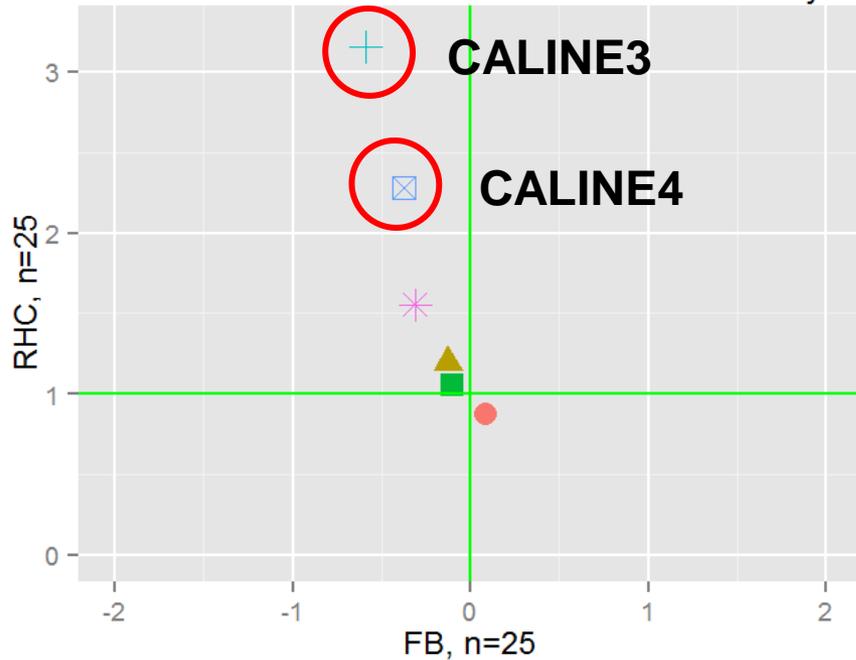


Model Performance Evaluations and Intercomparisons

- Result summaries in the following slides are based on Heist et al. (2013), Estimating near-road pollutant dispersion: A model inter-comparison, *Trans. Res. D.*, 93-105
- Published findings from two field studies with emissions of SF₆ tracer specifically designed for evaluation of mobile emission modeling
 - CALTRANS99 tracer experiment
 - Idaho Falls barrier tracer experiment

CALTRANS Study: Model performance summary

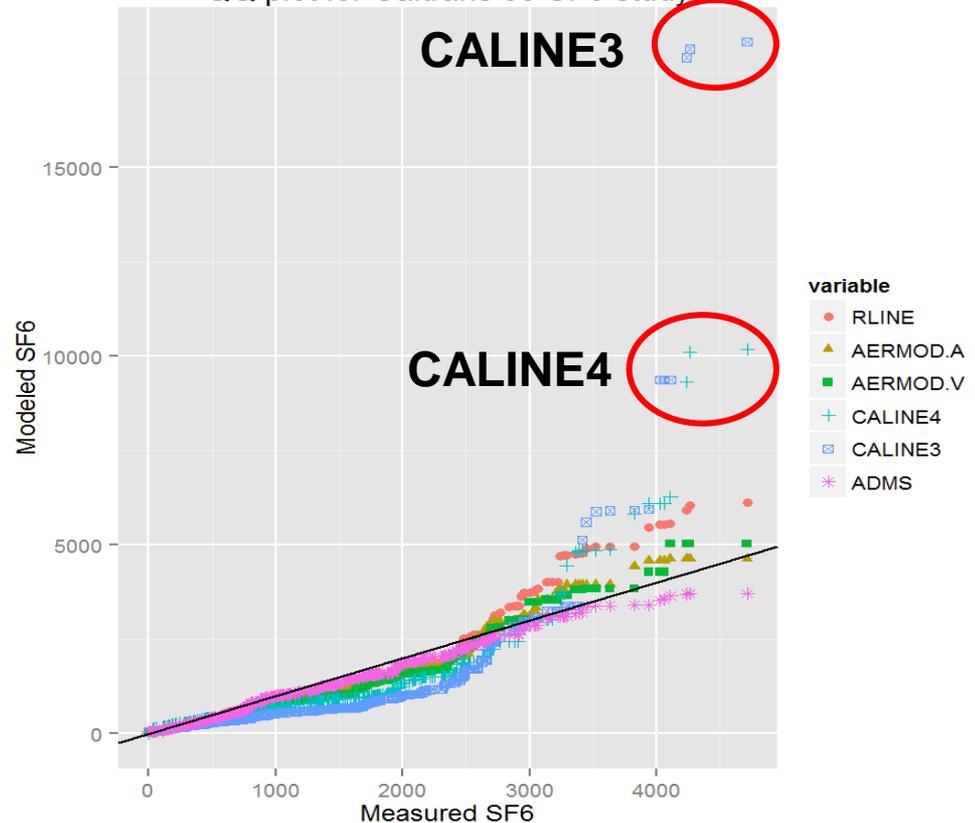
FB vs RHC for CALTRANS 99 SF6 study



- Model statistics show that AERMOD/RLINE almost identical
- CALINE overpredicts

- Q-Q plot shows that AERMOD is best at highest concentrations

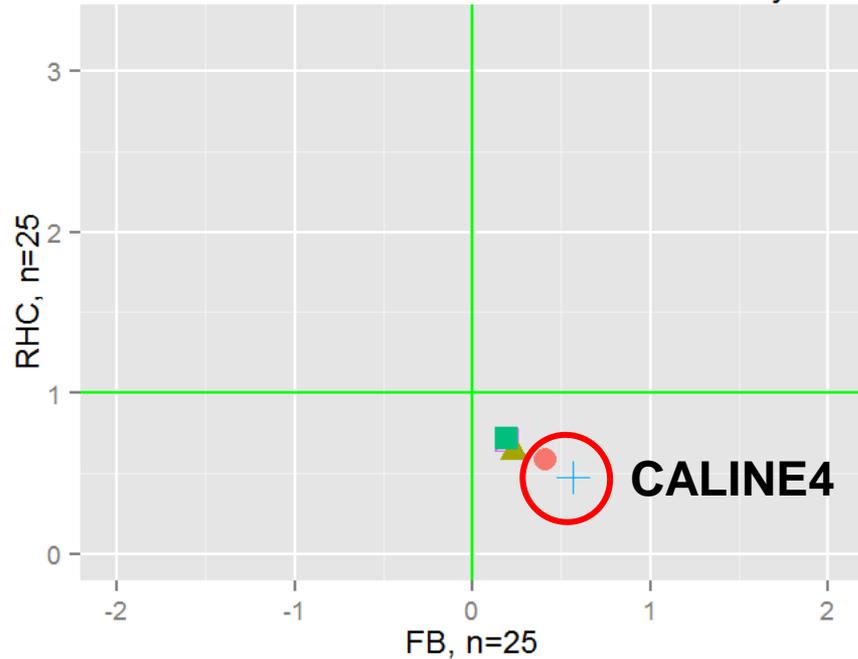
QQ plot for Caltrans 99 SF6 study



Idaho Falls Tracer Study: Model performance summary

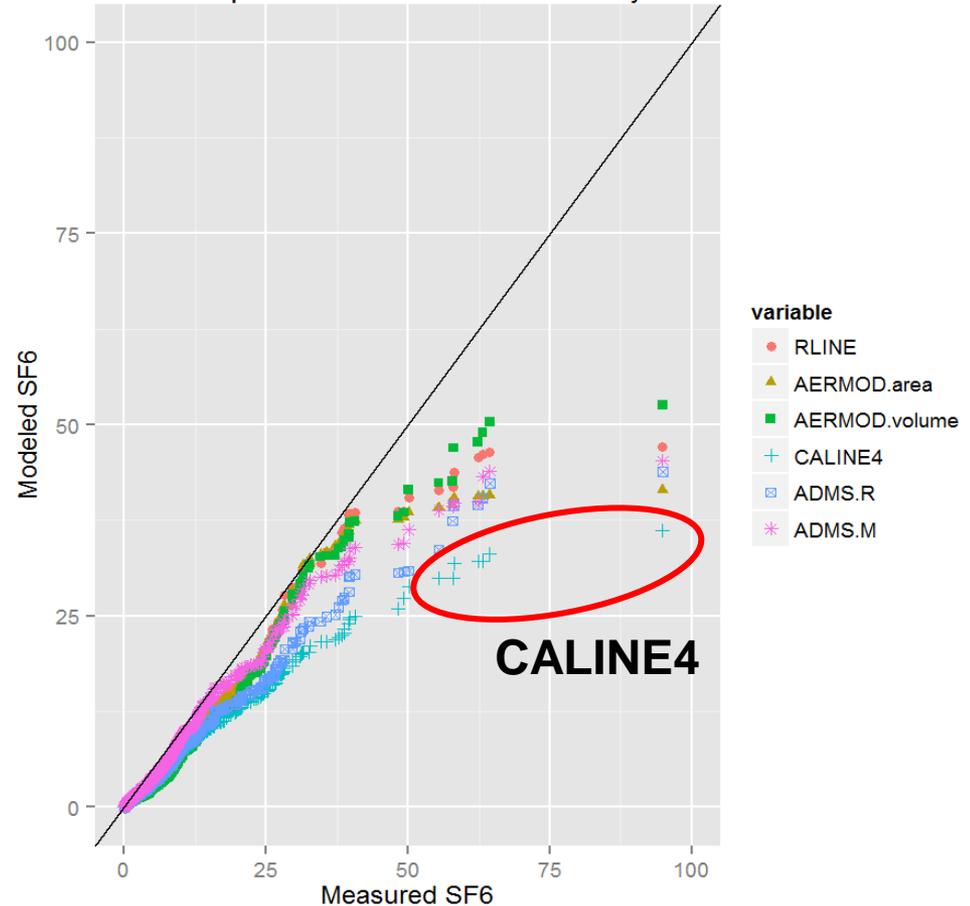
- Q-Q plot shows that AERMOD/RLINE is best at highest concentrations

FB vs RHC for Idaho Falls SF6 study



- Model statistics show that AERMOD/ADMS almost identical
- CALINE underpredicts

QQ plot for Idaho Falls SF6 study





Streamlined implementation for mobile sources

- Appendix W NPRM will bring commonality and consistency in modeling analyses for EPA regulatory applications
 - AERMOD already preferred for PM_{2.5}, PM₁₀
 - One model for mobile sources rather than 4
 - AERMOD has more options for source characterization and computation of design values
 - FAA uses AERMOD in their EDMS/AEDT
- EPA fully supports AERMOD with continued development and updates to meet regulatory needs and issues



EPA Transition Plans Under Appendix W NPRM

- EPA is taking comment on transition period from CALINE3 to AERMOD in NPRM
 - Proposing a 1 year transition period after final rule, i.e., slightly less than 2 years from now until formal transition to AERMOD
- EPA plans to provide training
 - Training package with examples
 - Webinars and trainings for stakeholders
 - Air Pollution Training Institute course # 423, Air pollution dispersion models
 - Project level training for Hot-spot analyses



Relevant docket items

- Document Title: Technical Support Document (TSD) for Replacement of CALINE3 with AERMOD for Transportation Related Air Quality Analyses, EPA Document EPA-454/B-15-002
- http://www.epa.gov/ttn/scram/11thmodconf/CAL3_AERMOD_Replacement_TSD.pdf